

Serial No. 09/683,149

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Amendments to the Claims:

1. (Currently amended) An apparatus for depositing a uniform coating on a planar surface of a movable substrate, said apparatus comprising:

a) at least one array of a plurality of individual plasma sources that are separate from each other for generating a plurality of plasmas, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;

b) a deposition chamber for containing said movable substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, and wherein said plasma chamber is maintained at a first predetermined pressure and said deposition chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and

c) ~~at least one~~ a common reactant gas injector disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said movable substrate for providing a uniform flow rate of at least one reactant gas into each of said plurality of plasmas in said at least one array, wherein said common reactant gas injector is circumferentially disposed with respect to said plurality of plasmas.

2. (Original) The apparatus according to Claim 1, wherein at least one of said plurality of plasma sources is an expanding thermal plasma source.

3. (Original) The apparatus according to Claim 1, wherein said at least one array includes at least one linear array of said plurality of plasma sources.

4. (Original) The apparatus according to Claim 1, wherein said at least one array includes at least one two dimensional array of said plurality of plasma sources.

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5. (Original) The apparatus according to Claim 1, wherein said first predetermined pressure is at least about 0.1 atmosphere.

6. (Original) The apparatus according to Claim 5, wherein said first predetermined pressure is about 1 atmosphere.

7. (Original) The apparatus according to Claim 1, wherein said second predetermined pressure is less than about 1 torr.

8. (Original) The apparatus according to Claim 1, wherein said second predetermined pressure is less than about 100 millitorr.

9. (Original) The apparatus according to Claim 1, wherein said plasma source gas comprises at least one of argon, nitrogen, hydrogen, helium, neon, krypton, and xenon.

10 (Currently amended) A common reactant gas injector for injecting a uniform flow of at least one reactant gas into a plurality of plasmas generated by an array of a plurality of plasma sources, said common reactor injector comprising:

a) a reactant gas inlet comprising a tubular-walled structure having an interior space through which said at least one reactant gas is supplied from a reactant gas source, wherein said reactant gas inlet is disposed between said array and a movable substrate, and wherein said reactant gas inlet is circumferentially disposed with respect to said plurality of plasmas;

b) a first plurality of orifices proximate to a first plasma, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said at least one reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and

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c) a second plurality of orifices proximate to a second plasma, each of said second plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said at least one reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

11. (Original) The reactant injector according to Claim 10, wherein said first plurality of orifices comprises a first predetermined number of orifices having a first linear density and said second plurality of orifices comprises a second predetermined number of orifices having a first linear density.

12. (Original) The reactant injector according to Claim 11, wherein said first predetermined number is equal to said second predetermined number.

13. (Original) The reactant injector according to Claim 11, wherein said first linear density is equal to said second linear density.

14. (Original) The reactant injector according to Claim 11, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being equal to said first conductance.

15. (Original) The reactant injector according to Claim 11, wherein said first predetermined number is different from said second predetermined number.

16. (Original) The reactant injector according to Claim 11, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being different from said first conductance.

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17. (Original) The reactant injector according to Claim 11, wherein said reactant injector comprises an injector ring encompassing said array.

18. (Currently amended) An apparatus for depositing a uniform coating on a surface of a movable substrate, said apparatus comprising:

- a) at least one array of a plurality of individual plasma sources that are separate from each other for generating a plurality of plasmas, wherein at least one of said plurality of plasma sources is an expanding thermal plasma source, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;
- b) a deposition chamber for containing said movable substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, wherein said plasma chamber is maintained at a first predetermined pressure and said deposition chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and
- c) ~~at least one~~ a common reactant gas injector disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said movable substrate for injecting a uniform flow of at least one reactant gas into each of said plurality of plasmas, wherein said common reactant gas injector is circumferentially disposed with respect to said plurality of plasmas, said common reactant gas injector comprising: (i) a reactant gas inlet comprising a tubular-walled structure having an interior space through which said reactant gas is supplied from at least one reactant gas source; (ii) a first plurality of orifices proximate to a first plasma, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and (iii) a second plurality of orifices proximate to said second plasma, each of said second plurality

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of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

19. (Original) The apparatus according to Claim 18, wherein said first plurality of orifices comprises a first predetermined number of orifices having a first linear density and said second plurality of orifices comprises a second predetermined number of orifices having a second linear density.

20. (Original) The apparatus according to Claim 19, wherein said first predetermined number is equal to said second predetermined number.

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21. (Original) The apparatus according to Claim 19, wherein said first predetermined number is different from said second predetermined number.

22. (Original) The apparatus according to Claim 19, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being equal to said first conductance.

23. (Original) The apparatus according to Claim 19, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being different from said first conductance.

24. (Original) The apparatus according to Claim 18, wherein said at least one common reactant gas injector comprises an injector ring encompassing said array.

25. (Original) The apparatus according to Claim 18, wherein said at least one array includes at least one linear array of said plurality of plasma sources.

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~~26. (Original) The apparatus according to Claim 18, wherein said at least one array includes at least one two-dimensional array of said plurality of plasma sources.~~

~~27. (Original) The apparatus according to Claim 18, wherein said first predetermined pressure is at least about 0.1 atmosphere.~~

~~28. (Original) The apparatus according to Claim 27, wherein said first predetermined pressure is about 1 atmosphere.~~

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~~29. (Original) The apparatus according to Claim 18, wherein said second predetermined pressure is less than about 1 torr.~~

~~30. (Original) The apparatus according to Claim 29, wherein said second predetermined pressure is less than about 100 millitorr.~~

~~31. (Original) The apparatus according to Claim 18, wherein said plasma source gas comprises at least one of argon, nitrogen, hydrogen, helium, neon, krypton, and xenon.~~

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32-44. (Withdrawn)